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# Terms of Reference

# Hydropower Development Project

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# Environmental Impact Assessment Studies

## Background

*<Description of the project, rationale, development contest, environmental studies completed to date.>*

## Objective

The [Research institute for hydro projects], working in association with 18 academic institutions, design and research institutes and State, Provincial and County government departments, has succeeded in assembling a very substantial database on which objective assessment of the positive and negative impacts of the [project name] Project can be made. In fact, there is also good reason to believe that the [Research institute for hydro projects]'s overall assessment of environmental impacts, namely; that the project has potential to result in environmental deterioration if it were to proceed without effective mitigation measures, is also correct. On the other hand, it is presently not clear that the content, implementation arrangements or costs for environmental monitoring and management are sufficient to adequately mitigate the identified impacts.

Similarly, it is considered that there is a need to broaden and strengthen the presentation of the environmental impact analysis to meet currently accepted international standards for evaluation of environmentally significant developments. In particular, there is considerable potential to improve the analysis and presentation of the balance of benefits and dis-benefits of the project.

Finally, it is considered that there may be some avenues for improving the overall environmental profile of the development through the development and implementation of innovative environmental improvement activities which have not yet been sufficiently explored.

In this context, the objectives of these TOR are threefold, as follows:

(a) To prepare a consolidated Environmental Assessment (EA) report and Environmental Summary which fully satisfies [donor] requirements - using the existing database, to compile a stand-alone, comprehensive Environmental Impact Assessment (EIA) which fully satisfies relevant [donor] requirements regarding scope and content (refer [donor] [directive]) and which:

1. presents all relevant data in a form which is concise, comprehensive and easy to understand making maximum use of graphs, tables and other aids to understanding;
2. provides sufficient information for readers to draw their own conclusions regarding impacts;
3. provides a comprehensive discussion of the balance of positive and negative implications of the proposed development;
4. provides depth of discussion which is commensurate with the significance of the particular issue being addressed.

(b) Broadening and strengthening the approach to environmental and management - in light of the impact assessment, to prepare a stand-alone environmental monitoring and management plan (EMMP) which is:

1. relevant to the significant issues identified;
2. realistic in terms of the institutional framework and technical capabilities of the designated participants;
3. practical in light of social, geographical and other relevant considerations; and,
4. financially sustainable in the long term.

The EMMP should also be summarized in the EA report;

(c) Leveraging environmental benefits from the project - identifying opportunities to go beyond impact mitigation by using the funding opportunities provided by the project to address existing environmental management deficiencies in the study area by identifying and preparing components to be considered for support under the project.

## Scope of the Work

### Preparation of Consolidated EA Report.

The work required is partly technical and partly editorial. The CIPM report provides a very comprehensive discussion of the technical strengths and weaknesses of the existing documentation and the consultants should refer to this in assessing the scope of work required. However, if the consultant has alternative views on the nature of the additional work required they should feel free to express them and adapt their approach accordingly.

Regarding technical aspects, particular account should be taken of:

(a) Project alternatives - the following alternatives should be addressed to an appropriate level of detail:

1. the "no development alternative";
2. the alternative of generating equivalent power by alternative means (e.g. coal-fired thermal);
3. the alternative of relocating the dam to a location immediately of the [river] (information on this option may not be readily available and it may be necessary for [Research institute for hydro projects] to generate original information) - this option is of particular interest and should be discussed in rather more detail than the other options;
4. NSLs at the proposed site.

(b) Cumulative impacts - as previously mentioned, [project name] will be but one (albeit large) of a cascade of existing and proposed developments on the [river]. An assessment of the cumulative impacts of these developments and the incremental effect of the [project name] development should be made within the limits possible given the available information. In undertaking this assessment, account needs to be taken of the fact that about half of the cascade has already been developed. The assessment should focus on identifying actual or potential environmental consequences and specifying what new or supplementary monitoring, research and other activities ought to be implemented to offset expected or possible adverse impacts;

(c) Impact of "off-site" developments - the most notable off-site developments include: high voltage transmission lines; a construction access road; and, the resettlement program. The assessment of the transmission lines should be restricted to a review of the proposed routes in relation to areas of significant natural vegetation, forests, etc. The resettlement program has been planned in great detail and there is a wealth of information available about it. The main objective of the analysis in the EA report should be to identify general impact potentials and prescribe equally general environmental safeguards and related monitoring activities which ought to be undertaken to offset potential impacts. In most case, specific impact assessment for each resettlement operation is neither necessary nor required. The only exception to this might be in cases where existing or potential nature conservation areas might be directly impacted but this would be better pursued under (d) following;

(d) Nature conservation impacts - one of the major concerns regarding the project is the nature and significance of both direct (inundation) and indirect (increased land development pressure) effects of the development on five nature reserves three existing and two proposed) in the reservoir area. Considerable work on review of existing reports, discussion with relevant local experts and field inspections will be required to establish the present status and conservation value of these reserves (it is believed that at least one may be of little or no conservation significance since it has been wholly or at least substantially deforested since it was gazetted), the of existing management arrangements, the impacts of the development and strategies of offsetting expected impacts including a review of [Research institute for hydro projects]'s current proposals (many of which may not be technically and/or practically feasible). This area of work may offer the potential to improve the conservation effectiveness of the affected reserves through strategies such as alteration of boundaries, expansion of reserve areas, upgrading the status of the reserves, preparation of management plans, improved staff and facilities and should be addressed in detail. The analysis should be taken as far as is possible given the existing data supplemented by field inspection. As required, recommendations should be made regarding additional and investigations which could be undertaken during the construction phase and prior to reservoir filling to fill information gaps and further elaborate development proposals. For those reserves where such opportunities exist, separate reports should be prepared to provide a basis for inclusion of sub-components under the project;

(e) Impact of point and non-point pollution sources within the catchment on water quality in the reservoir and specification of control and management strategies - [Research institute for hydro projects] has already collated an emission database and carried out various water quality calculations. These data should be critically reviewed and the major point industrial sources should be inspected in the field to allow assessment of the likely accuracy of existing data and technical feasibility for clean-up of the more important sources, particularly sources of intractable pollutants. For these latter, separate short diagnostic reports should be prepared including concept designs for water pollution control and feasibility level cost estimates. The consultants should indicate which sources (if any) ought to be controlled as a condition of the project proceeding;

(f) Public health impacts - again, there is considerable information available but it needs to be efficiently summarized and critically reviewed to identify significant risks and specify realistic and practical management and control strategies;

(g) Fisheries (wild and artificial) impacts - the existing analysis for both the reservoir and downstream areas is considered to be deficient and the monitoring and management proposals also require critical review. Cumulative implications of the cascade development should also be covered. As with nature conservation, there is potential to use development of the project to significantly improve fisheries management in the area; and,

(h) Balance of project benefits and dis-benefits - the present analysis is couched in the framework of quantitative matrix which is not particularly compelling. A better discussion incorporating both quantitative and qualitative considerations. In particular, the benefits side of the balance is not presently well developed. One major form of benefits which can be convincingly quantified will be in the form of flood control. Considerable work on this subject has been done and will be available through institutions such as the [water conservation bureau].

Regarding editorial aspects, it can be anticipated that the proposed development may be of interest to a wide spectrum of individuals and organizations of varying technical expertise and knowledge of the regional environment and development situation. It is essential therefore that the EA should embody a particularly high standard of technical writing which is relevant but concise, supplemented by technical annexes as required, and makes maximum use of tables, graphs, high quality and readily reproducible artwork and other aids to effective communication.

Environmental Management and Monitoring Plan (EMMP) - the management and control strategies identified in the EA Report need to be translated into a relevant, realistic, practical, cost efficient and financially sustainable EMMP covering both the construction and operational phases. The plan should be prepared as a stand-alone report for ready reference by all participants and summarized in the EA report. The plan should:

(a) Identify and specify the monitoring and management tasks to be undertaken during both phases of the development;

(b) Specify the institutional arrangements for implementation, which will need to be discussed with [corporation] taking account of its proposals for management of other aspects of the development and will also need to take account of possible roles and sources of funds for existing government and other agencies with a view to maximizing utilization of existing skills and equipment;

(c) Identify staff, materials and equipment needs for implementation the associated costs; and,

(d) Identify training, development and technical assistance needs and associated costs (including provision for a process of "handover" from the plan designers - [research institute for hydro projects] and the consultants to be appointed under this commission - and those responsible for plan implementation).

Opportunities to Leverage Environmental Benefits from the Project - [research institute for hydro projects]'s analysis indicates that the project has some adverse impact potentials although it is believed that these can be adequately mitigated. However, there may also be opportunities provided to improve the standard of environmental management in the region through injection of money and skill occasioned by construction of the project and also by the longer term availability of finance through vehicles such as the [fund] (a levy on every kilowatt hour of energy generated by the project made available to Provincial and local governments for expenditure in the affected communities) and/or application of technical skills and experience made possible through [corporation]'s on-going management operations.

The scope of this potential has not been seriously considered thus far and the consultant's brief in this connection is to use its imagination to identify opportunities and prepare proposals to be considered for inclusion in the project as required. Areas which might be considered include:

(a) Concessional loan financing for remediation of key industrial point sources of water pollution within the catchment;

(b) Supplementary financial and/or technical support for natural reserve management within the catchment;

(c) Technical assistance, training, pilot programs, etc. to involve farmers resident in nature reserves in participatory management of reserves;

(d) Support for applied research on agro-forestry development of marginal lands, particularly very steeply sloping land, in resettlement areas;

(e) Pilot programs on alternative, multi-purpose plantation species.

## Study team

The work will be undertaken by a team to be fielded by the consultant who will work in close association with staff of [research institute for hydro projects]'s planning division and, through them, the various design institutes, universities and government agencies who have worked on the project so far. All costs associated with support to be provided by [research institute for hydro projects] and other organizations will be financed by separate budget, as noted in the Letter of Invitation.

The suggested study team membership, allocation of responsibilities and person month allowances are as follows:

1. Team Leader/Environmental Scientist or Engineer - overall project management, technical direction of team members, liaison with [corporation]/[research institute for hydro projects] and other counterparts, principal author of the EA and related reports. Suggested time allowance - 8 person months;
2. Natural Resources Management Specialist(s) - assessment of impacts on flora and fauna, review of status of existing conservation areas including field inspections as required, development of relevant environmental management and monitoring strategies as required. Note: these duties can be split between one or more people (e.g. plant ecologist, wildlife management specialist) if required. Suggested time allowance - 6 person months;
3. Water Pollution Control/Water Quality Specialist - review of existing and potential future point and non-point pollution sources within the reservoir catchment, review of reservoir water quality projections, development of industrial point source clean-up proposals as required. Suggested time allowance 3 person months;
4. Hydrologist/Sedimentation Specialist - review of sediment inflow projections and related impact assessments, review, elaboration of downstream hydrological/sedimentation impacts and, review of flood control benefits. Suggested time allowance - 2 person months;
5. Sociologist/public health specialist - review of public health implications, finalization of public health management and protection measures. Suggested time allowance - 2 person months;
6. Unallocated - a provision of 2 person months has been made which can be allocated at the discretion of the consultants to either the allowance for nominated experts or to add (an) additional expert(s) to the team.

The total person month allowance therefore, is 23 months.

## REPORTING AND TIME SCHEDULE

### Reporting

Apart from the reports specifically provided for or foreshadowed in the Scope of Work, the Consultants will prepare and submit to [corporation] for review:

- a brief inception report following initial review of the database and discussion of the detailed work plan with [research institute for hydro projects] indicating any proposed changes to the work plan and/or schedule as set out in the original proposal (end of Project Month 1);

- short (1 - 2 page) monthly reports comparing planned with actual person month projections, noting any issues/problems encountered which significantly impinge on completion of the work as planned. The reports will be submitted in [language] (3 copies - translation from [language] to be undertaken by [research institute for hydro projects]) to [corporation] with a copy in [language] being forwarded to the [donor] for information.

### Time Schedule

[Language] language drafts of all relevant reports should be completed no later than two months before pre-appraisal of the project by the [donor]. In allocating time for the Team Leader, allowance should be made for the likelihood that:

(a) the [donor] will make comments and suggestions on the various draft documents and that these will have to be taken into account in finalization of the documents; and,

(b) the [donor] will require the team leader to be in the field to work with [research institute for hydro projects] and relevant pre-appraisal mission members on detail aspects of the EMMP and review/discussion of any proposals additional environmental sub-components proposed for inclusion in the project.